

west virginia department of environmental protection

Office of Oil and Gas 601 57th Street SE Charleston, WV 25304 (304) 926-0450 (304) 926-0452 fax Earl Ray Tomblin, Governor Randy C. Huffman, Cabinet Secretary www.dep.wv.gov

October 28, 2014

WELL WORK PERMIT Horizontal 6A Well

This permit, API Well Number: 47-1706570, issued to ANTERO RESOURCES CORPORATION, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin

Chief

Operator's Well No: PETER UNIT 1H

Farm Name: HILL, PHILLIP N. ET AL

API Well Number: 47-1706570

Permit Type: Horizontal 6A Well

Date Issued: 10/28/2014

Promoting a healthy environment.

API Number: <u>17-06570</u>

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. <u>Failure to adhere to the specified permit</u> conditions may result in enforcement action.

CONDITIONS

- This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
- 2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
- 3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
- 4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
- 5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
- 6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
- 7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
- 8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
- 9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

1706570

WW-6B (9/13)

STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS WELL WORK PERMIT APPLICATION

1) Well Operator: Ante	ro Resources Corporation	on 494488557	017 - Doddridge	Grant	Smithburg 7.5'
		Operator ID	County	District	Quadrangle
2) Operator's Well Num	iber: Peter Unit 1H	Well Pa	d Name: Lemle	у	***
3) Farm Name/Surface (Owner: Phillip N. Hill,	et al Public Roa	ad Access: CR	30	
4) Elevation, current gro	ound: ~1,320'	Elevation, proposed	(C)		77 12.
5) Well Type (a) Gas	Oil	Und	erground Storag	e	
Other					
(b)If Ga		Deep			Don
	Horizontal				adl
6) Existing Pad: Yes or l		7)			•
7) Proposed Target Forn):
SALES AND	'TVD, Anticipated Thickne	ess- 55 feet, Associated	Pressure- 2,950	*	
8) Proposed Total Vertice	•	5			
9) Formation at Total Vo	ertical Depth: Marcelle	us Shale			
10) Proposed Total Mea	sured Depth: 11,300'				
11) Proposed Horizontal	l Leg Length: 3,069'				
12) Approximate Fresh	Water Strata Depths:	291', 345', 366'			
13) Method to Determin	e Fresh Water Depths:	Offset well records. D	epths have been ad	justed accor	ding to surface elevations.
14) Approximate Saltwa	iter Depths: 1460', 16	73', 1700', 1710'			
15) Approximate Coal S	seam Depths: 980'				
16) Approximate Depth	to Possible Void (coal	mine, karst, other):	None Anticipated		***
17) Does Proposed well directly overlying or adj			No	7	
(a) If Yes, provide Mir	ne Info: Name:				
5. € 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Depth:			H	eceived
	Seam:				
	Owner:			1	AUG 2 1 2014

Office of Oil and Gas WV Dept. of Environmental Protection WW-6B (9/13)

18)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	420'	420'	CTS, 583 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2450'	2450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	11,300'	11,300'	2,710 Cu. Ft
Tubing	2-3/8"	New	N-80	4.7#		7,200'	
Liners							

DCW 2614

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tall - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

PACKERS

Kind:	N/A	
Sizes:	N/A	Poorition
Depths Set:	N/A	neceived

AUG 2 1 2014

Office of Oil and Gas WV Dept. of Environmental Protection WW-6B (9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:	
Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.	
	ŀ
20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate	;
Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as he attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."	
21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 4.31 acres* (See note	below)
22) Area to be disturbed for well pad only, less access road (acres): 4.31 acres	
23) Describe centralizer placement for each casing string:	
onductor: no centralizers	
urface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole	
o surface. Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.	
roduction Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.	<u>eive</u> c
14) Describe all compart additives accordated with each compart type:	Ò 1 0014
24) Describe all cement additives associated with each cement type: AUG AUG	<u>2 1 2014</u>
urface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake	
stermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat Office of 0	Oil and Gas
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51v Dept. of Envir Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20	ronmental Prote
1044CHUII. 1811 CEIREIR: CI833 II T 43 FF3 CAICIUIII CAIUUIIARE T 1.04 FC 100 T 0.25 ACG047 T 0.037 ACG451 T 0.27 ACG620	
25) Proposed borehole conditioning procedures:	

Conductor: blowhole clean with air, run casing, 10 bbis fresh water.

Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Please note that this location is sharing the Access Roads (10.4 acres). Truck Turnaround Pad (1.36 acres), and Excess/Topsoil Material Stockpiles (5.65 acres) with the Revival pad and Lemeley Centralized Freshwater Impoundment sites. Reference "Site Plan/Construction Staging Note" on page 1, of the Lemley Well Pad design. The Lemley pad will consist of 4.31 total acres of disturbance which is referenced as a "Staging Area" on the Lemley Centralized Freshwater Impoundment design.

WW-9 (9/13)

API Number 4	7 - 017	-	
Operat	or's Well No	, Peter Unit 1H	

STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation OP Co	ode _494488557
Watershed (HUC 10) Howell Run Quadrangle Smithbu	rg 7.5'
Elevation 1,301' County Doddridge Dist	rrict Grant
Do you anticipate using more than 5,000 bbls of water to complete the proposed well work. Will a pit be used? Yes No	
If so, please describe anticipated pit waste: No pit will be used at this sile. Drilling and flowback fluids will	be stored in tanks. Cuttings will be tanked and hauled off site.
	ml.? N/A VIII Will be tanked and hauled off site.
Proposed Disposal Method For Treated Pit Wastes:	4,11
Land Application Underground Injection (UIC Permit Number	
Reuse (at API Number Future permitted well locations when applicable. Al	
Off Site Disposal (Supply form WW-9 for disposal location) (Other (Explain	
Will closed loop system be used? If so, describe: Yes	
Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil ba	Sufface - Air/Freshwater, Intermediate - ISEd, etc. Dust/Stiff Foam, Production - Water Based Mud
-If oil based, what type? Synthetic, petroleum, etc. N/A	
*	
Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Stored in tanks, to	removed offsite and taken to landfill.
-If left in pit and plan to solidify what medium will be used? (cement, lime, saw	
-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98)	
I certify that I understand and agree to the terms and conditions of the GENERA on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environce of the permit are enforceable by law. Violations of any term or condition of law or regulation can lead to enforcement action. I certify under penalty of law that I have personally examined and am famil application form and all attachments thereto and that, based on my inquiry of thos obtaining the information, I believe that the information is true, accurate, and complementation for submitting false information, including the possibility of fine or imprisonmentation.	ronmental Protection. I understand that the the general permit and/or other applicable iar with the information submitted on this e individuals immediately responsible for etc. I am aware that there are significant nt.
penalties for submitting faise information, including the possionity of time of improsonme	WEGAN DANS
Company Official Signature	NOTARY PUBLIC STATE OF COLORADO
Company Official (Typed Name) Kevin Kilstrom	NOTARY ID 20144028112 COMMISSION EXPIRES JULY 17, 2018
Company Official Title Vice President of Drilling and Production	COMMISSION EXPERIENCE
Subscribed and sworn before me this Last day of August	Received
My C. Darling	Notary Public AUG 2 1 2014
My commission expires July 17, 2018	AUG Z 1 ZVI4

Office of Oil and Gas
W// Dept. of Environmental Protection

Form WW-9	Operator's Well No. Peter Un
Antero Resources Corporation	
Proposed Revegetation Treatment: Acres Disturbed 4.31* (See note below) Prevegetation pH
Lime 2-4 Tons/acre or to correct to p	
Fertilizer type Hay or straw or Wood Fiber (will be used	where needed)
Fertilizer amount 500	lbs/acre
Mulch Mulch Tons Mulch Total State of the Access Roads (10.4 acres), Truck Turnaround and Freshwater Impoundment sites. Reference "Site Plan/Construction Staging Nonce which is referenced as a "Staging Area" on the Lemley Centralized Freshwate Se	ote" on page 1 of the Lemiey Well Pad design, The Lemiey pad will consist of 4.5
Temporary	Permanent
Seed Type lbs/acre	Seed Type Ibs/acre
Annual Rye Grass 40	Crownvetch 10-15
*See Attached Table 3 for addittional seed type (Lemley Pad Design Page 18)	*See attached table 4a for additional seed type (Lemley Pad Design Pag
	to the of grand good requested by surface our
*or type of grass seed requested by surface owner	*or type of grass seed requested by surface ow
NOTE: No Fescue or Timothy Grass shall Attach: Drawing(s) of road, location, pit and proposed area for land a	be used.
NOTE: No Fescue or Timothy Grass shall Attach: Drawing(s) of road, location, pit and proposed area for land a provided) Photocopied section of involved 7.5' topographic sheet. Plan Approved by: Douglas Asulor	be used.
Attach: Drawing(s) of road, location, pit and proposed area for land a provided) Photocopied section of involved 7.5' topographic sheet. Plan Approved by: Douglas Apular	application (unless engineered plans including this info have

Form WW-9 Additives Attachment

SURFACE INTERVAL

- 1. Fresh Water
- 2. Soap -Foamer AC
- 3. Air

INTERMEDIATE INTERVAL

STIFF FOAM RECIPE:

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Congor 404 (11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard (9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

PRODUCTION INTERVAL

1. Alpha 1655

Salt Inhibitor

2. Mil-Carb

Calcium Carbonate

3. Cottonseed Hulls

Cellulose-Cottonseed Pellets – LCM

4. Mil-Seal

Vegetable, Cotton & Cellulose-Based Fiber Blend - LCM

5. Clay-Trol

Amine Acid Complex – Shale Stabilizer

6. Xan-Plex

Viscosifier For Water Based Muds

7. Mil-Pac (All Grades)

Sodium Carboxymethylcellulose – Filtration Control Agent

8. New Drill

Anionic Polyacrylamide Copolymer Emulsion – Shale Stabilizer

9. Caustic Soda

Sodium Hydroxide – Alkalinity Control

10. Mil-Lime

Calcium Hydroxide - Lime

11. LD-9

Polyether Polyol - Drilling Fluid Defoamer

12. Mil Mica

Hydro-Biotite Mica – LCM

13. Escaid 110

Drilling Fluild Solvent - Aliphatic Hydrocarbon

14. Ligco

Highly Oxidized Leonardite - Filteration Control Agent

15. Super Sweep

Polypropylene - Hole Cleaning Agent

16. Sulfatrol K

Drilling Fluid Additive - Sulfonated Asphalt Residuum

17. Sodium Chloride, Anhydrous

Inorganic Salt

18. D-D

Drilling Detergent - Surfactant

19. Terra-Rate

Organic Surfactant Blend

20. W.O. Defoam

Alcohol-Based Defoamer

21. Perma-Lose HT

Fluid Loss Reducer For Water-Based Muds

22. Xan-Plex D

Polysaccharide Polymer - Drilling Fluid Viscosifier

23. Walnut Shells

Ground Cellulosic Material - Ground Walnut Shells - LCM

24. Mil-Graphite

Natural Graphite - LCM

25. Mil Bar

Barite - Weighting Agent

26. X-Cide 102

Biocide

27. Soda Ash

Sodium Carbonate - Alkalinity Control Agent

28. Clay Trol

Amine Acid complex - Shale Stabilizer

29. Sulfatrol

Sulfonated Asphalt - Shale Control Additive

30. Xanvis

Viscosifier For Water-Based Muds

31. Milstarch

Starch - Fluid Loss Reducer For Water Based Muds

32. Mil-Lube

Drilling Fluid Lubricant



Well Site Safety Plan Antero Resources

Well Name: Phebe Unit 2H, Phebe Unit 1H, Abram Unit 2H,

Abram Unit 1H, Trainer Unit 2H, Trainer Unit 1H, Rollins Unit 2H, Peter Unit 2H, Peter Unit

1H, Milo Unit 2H

Received

Pad Location: Lemley Pad

AUG 2 1 2014

Doddridge County/ Grant District

Office of Oil and Gas WV Dept. of Environmental Protection

GPS Coordinates: Lat 39° 19'34.87"/Long 80° 40'48.40" (NAD83)

Driving Directions:

From US 50 near Clarksburg, head west on US 50 for 16 miles. Turn right onto County Route 9/Tarkiln Run. Take an almost immediate left toward County Route 3/Big Flint Rd., and continue for 0.2 miles. Take the first right onto County Route 3/Big Flint Rd. and continue for 5 miles, then the access road will be on the left.

EMERGENCY (24 HOUR) CONTACT 1-800-878-1373

DCN 8-11-2014

Antero Resources Corporation

Appalachian Basin Peter Unit 1H Doddridge County

Quadrangle: Smithburg Watershed: Howell Run

District: Grant Date: 8-04-2014

